CLAIMS:

1. Viterbi bit detection method for detecting the bit values of bits of a channel data stream stored on a record carrier along an N-dimensional channel tube, N being at least two, of at least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions, comprising application of a row-based one-dimensional Viterbi bit detection method independent for each of the bit rows of said channel tube, wherein:

- calculation of the branch metrics for all possible state transitions in a Viterbi trellis of a one-dimensional row-based Viterbi detector, said transitions representing a number of subsequent bits in said bit row, said bits being the central-row bits of a cluster of the N-dimensional lattice of bits, is based on the difference of the received HF signal value with respect to a reference level, wherein said reference level depends on all bits of said cluster, said cluster comprising in addition to the central-row bits a number of primary neighbouring bits in each of a number of neighbouring bit rows on each side along said N-1 other directions of said central bit row along which the one-dimensional Viterbi bit detection method is applied, and wherein preliminary bit decisions for the primary neighbouring bits in the neighbouring bit rows are used for determining the reference level to be used for calculating said branch metrics, and
- selection of the bit value for the central bit of said cluster of the N-dimensional lattice of bits, corresponding with said received HF signal value, is based on the calculated branch metrics.

2. Method as claimed in claim 1,
wherein the preliminary bit decisions on said primary neighbouring bits in the neighbouring bit rows are obtained by threshold detection using a slicer level.

3. Method as claimed in claim 1,
wherein the bit values of the central row constituting each of said branches in the Viterbi

trellis of the central row are used for determining the preliminary bit decisions on said primary neighbouring bits in the neighbouring bit rows.

4. Method as claimed in claim 1,
wherein the preliminary bit decisions on the primary neighbouring bits are obtained by evaluation of a predetermined criterion which is determined by the sum over all the primary neighbouring bits, said sum comprising terms related to a subcriterion that is based on the differences of the HF signal value and a reference HF signal value corresponding to the bit cluster of each single primary neighbouring bit, which evaluation is done for all possible bit units obtained for all possible values of said primary neighbouring bits, and wherein the bit unit with the lowest value of said predetermined evaluation criterion is selected.

5. Method as claimed in claim 4,
wherein said subcriterion relates to the squared value of the difference of the HF signal value and a reference HF signal value corresponding to the bit cluster of each single primary neighbouring bit.

6. Method as claimed in claim 4,
wherein said subcriterion relates to the absolute value of the difference of the HF signal value and a reference HF signal value corresponding to the bit cluster of each single primary neighbouring bit.

7. Method as claimed in claim 1,
wherein the preliminary bit decisions on the primary neighbouring bits are obtained by use of soft-decision information.

8. Method as claimed in claim 1,
wherein further preliminary bit decisions on secondary neighbouring bits, being the neighbouring bits of said primary neighbouring bits but not being part of the central bit row of said cluster, are used for determining the preliminary bit decisions on said primary neighbouring bits.

9. Method as claimed in claim 1,
wherein said branch metrics are determined as the squared difference between the received

HF signal value for the central bit of said cluster and a reference HF signal value depending on the bit values of all bits of said cluster.

10. Method as claimed in claim 1,
wherein said branch metrics are determined as the absolute value of the difference between the received HF signal value for the central bit of said cluster and a reference HF signal value depending on the bit values of all bits of said cluster.

11. Method as claimed in claim 1
wherein N is 2 and wherein the bit values of bits of a channel data stream are stored on a record carrier along a two-dimensional channel strip of at least two bit rows one-dimensionally evolving along a first direction and aligned with each other along a second direction, said two directions constituting a two-dimensional lattice of bit positions.

12. Method as claimed in claim 11,
wherein the 2D lattice of bits is of the square type.

13. Method as claimed in claim 11,
wherein the 2D lattice of bits is of the hexagonal type.

14. Method as claimed in claim 13,
wherein said channel strip comprises at least three bit rows and wherein said hexagonal cluster comprises seven bits, three being located in the central bit row and two being located in an upper and lower primary neighbouring bit row, respectively.

15. Method as claimed in claim 13 and 14,
wherein preliminary bit decisions on secondary neighbouring bits are used for determining the preliminary bit decisions on said two neighbouring primary bits in each primary neighbouring bit row.

16. Method as claimed in claim 15,
wherein the two primary neighbouring bits of the hexagonal cluster located in the upper and lower primary neighbouring bit row, respectively, are grouped as primary neighbouring bit unit each bit unit being surrounded by eight neighbouring bits, five of which being secondary

neighbouring bits and three of which being the central-row bits of said hexagonal cluster, said three bits being set by the bits of the two states constituting each of the branches to be considered in the Viterbi trellis of the one-dimensional row-based Viterbi bit detector.

17. Method as claimed in claim 15,
wherein the two primary neighbouring bits of the hexagonal cluster located in the upper and lower primary neighbouring bit row, respectively, are grouped as a primary neighbouring bit unit together with one bit of the next neighbouring bit row constituting a bit unit consisting of 3 bits, each bit unit being surrounded by nine neighbouring bits, six of which being secondary neighbouring bits, and three of which being the central-row bits of said hexagonal cluster, said three bits being set by the bits of the two states constituting each of the branches to be considered in the Viterbi trellis of the one-dimensional row-based Viterbi bit detector.

18. Method as claimed in claim 16 or 17,
wherein the bit values of the secondary neighbouring bits being the neighbouring bits of the primary neighbouring bits not belonging to the central row of said hexagonal cluster are determined by threshold detection using a slicer level.

19. Method as claimed in claim 8,
wherein said branch metrics are calculated as an expectation value, in particular the average taken over all possible bit values of said secondary neighbouring bits using soft-decision information available for said secondary neighbouring bits.

20. Method as claimed in claim 1,
wherein N is 3 yielding a three-dimensional lattice of bits.

21. Method as claimed in claim 1,
wherein said row-based one-dimensional Viterbi bit detection method is applied iteratively and wherein preliminary bit decisions on the primary neighbouring bits are obtained from the output of said row-based one-dimensional Viterbi bit detection methods in a previous iteration.

22. Viterbi bit detector for detecting the bit values of bits of a channel data stream stored on a record carrier along an N-dimensional channel tube, N being at least two, of at

least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions, comprising a Viterbi bit detection unit for application of a row-based one-dimensional Viterbi bit detection method independent for each of the bit rows of said channel tube, comprising:

- means for calculation of the branch metrics for all possible state transitions in a Viterbi trellis of a one-dimensional row-based Viterbi detector, said transitions representing a number of subsequent bits in said bit row, said bits being the central-row bits of a cluster of the N-dimensional lattice of bits, said calculation being based on the difference of the received HF signal value with respect to a reference level, wherein said reference level depends on all bits of said cluster, said cluster comprising in addition to the central-row bits a number of primary neighbouring bits in each of a number of neighbouring bit rows on each side along said N-1 other directions of said central bit row along which the one-dimensional Viterbi bit detection method is applied, and wherein preliminary bit decisions for the primary neighbouring bits in the neighbouring bit rows are used for determining the reference level to be used for calculating said branch metrics, and
- means for selection of the bit value for the central bit of said cluster of the N-dimensional lattice of bits, corresponding with said received HF signal value, is based on the calculated branch metrics.

23. Bit detector as claimed in claim 22,
wherein said selection means comprise add-compare-select units and back-tracking units.

24. Method of reproduction of a user data stream, which is error correction code and modulation code encoded into a channel data stream and stored on a record carrier, comprising a bit detection method as claimed in claim 1 for detecting the bit values of bits of said channel data stream, a modulation code decoding method and an error correction code decoding method.

25. Reproduction device for reproduction of a user data stream, which is error correction code and modulation code encoded into a channel data stream and stored on a record carrier, comprising a bit detector as claimed in claim 22 for detecting the bit values of bits of said channel data stream, a modulation code decoder and an error correction code

decoder.

26. Computer program comprising program code means for causing a computer to perform the steps of the methods as claimed in claim 1 or 24 when said computer program is executed on a computer.

27. Optical recorder comprising a Viterbi bit detector for detecting the bit values of bits of a channel data stream stored on a record carrier along an N-dimensional channel tube, N being at least two, of at least two bit rows one-dimensionally evolving along a first direction and being aligned with each other along at least a second of N-1 other directions, said first direction together with said N-1 other directions constituting an N-dimensional lattice of bit positions, comprising a Viterbi bit detection unit for application of a row-based one-dimensional Viterbi bit detection method independent for each of the bit rows of said channel tube, comprising:

- means for calculation of the branch metrics for all possible state transitions in a Viterbi trellis of a one-dimensional row-based Viterbi detector, said transitions representing a number of subsequent bits in said bit row, said bits being the central-row bits of a cluster of the N-dimensional lattice of bits, said calculation being based on the difference of the received HF signal value with respect to a reference level, wherein said reference level depends on all bits of said cluster, said cluster comprising in addition to the central-row bits a number of primary neighbouring bits in each of a number of neighbouring bit rows on each side along said N-1 other directions of said central bit row along which the one-dimensional Viterbi bit detection method is applied, and wherein preliminary bit decisions for the primary neighbouring bits in the neighbouring bit rows are used for determining the reference level to be used for calculating said branch metrics, and
- means for selection of the bit value for the central bit of said cluster of the N-dimensional lattice of bits, corresponding with said received HF signal value, is based on the calculated branch metrics.